

Determining the Birmingham Fire and Rescue Service's Abilities To Manage A Terrorist Incident Involving Biological Agents

STRATEGIC MANAGEMENT of CHANGE

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ABSTRACT

The problem identified for this applied research project was that the Birmingham Fire and Rescue Service had never been evaluated as to its abilities to handle an incident involving a terrorist attack using a biological warfare agent. It was the author's intent in preparing this study to determine whether or not the department could handle an incident involving this scenario and if not, what could be done to prepare the department for this type of incident. The historical research method was used in gathering data for this study.

The procedures used to collect data relative to this study consisted of a literature review and interviews with people familiar with either terrorism or biological warfare agents or in some cases, both areas. References were obtained from numerous sources including the National Fire Academy's Learning Resource Center (LRC), the Internet, commercially available reference materials, materials obtained from the area experts and from materials gathered from seminars, meetings and training programs.

The research questions that were identified are:

1. What is the possibility of a terrorist incident involving biological warfare agents occurring in Birmingham, Alabama?
2. How prepared is the Birmingham Fire and Rescue Service to manage an incident of this type?

3. Are outside agencies available for supporting the department in case of an incident of this type and how well prepared for an incident of this type are these agencies?

Information pertaining to the department's readiness was gathered by examining departmental assets such as the Hazardous Materials and Decontamination Unit's equipment and capabilities. Training records were examined along with the department's SOPs. Other departments and agencies were canvassed to determine their assets and support capabilities.

The study concluded that while much of the equipment needed to mitigate a situation of this type is presently available, much remains to be done especially in the fields of awareness and training. Overall, the author determined that the department is moderately prepared to respond to a terrorist incident involving biological warfare agents.

The recommendations made for improving the department's response capabilities included enacting a SOP dealing with chemical and biological weapons, improving and increasing the training given to responders and improving the abilities and response times of outside agencies.

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INTRODUCTION

The scope of research contained within this paper is limited to the question of whether or not the Birmingham Fire and Rescue Service is prepared to face a terrorist attack involving biological weapons. The terrorist attack aspect was chosen because, as was stated in a newspaper article by Barry Schweid, is that terrorism is on the rise worldwide. Biological weapons were chosen because these materials will cause the highest casualty rates of any of the Nuclear, Biological or Chemical (NBC) agents and as the United States Government's Senate Select Committee on Intelligence stated: "at least twenty countries have or may be developing nuclear, chemical or biological weapons."

Problem

The problem was that the Birmingham Fire and Rescue Service had never been evaluated as to its ability to handle a terrorist incident involving biological weapons.

Purpose

The purpose of this research paper is to determine the Birmingham Fire and Rescue Service's ability to respond to and successfully mitigate an incident involving a terrorist attack using a biological warfare agent. It was also used to identify the methods that could be used to improve the department's capabilities to respond to an incident of this type.

Research Method

The historical research method was used to gather information for this project. The research consisted of a literature review and personal interviews of subject matter experts.

Articles and materials were obtained from the National Fire Academy's Learning Resource Center (LRC), commercially available reference materials, the internet and from reference materials gathered from seminars, meetings and training programs.

Research Questions

1. What is the possibility of a terrorist incident involving biological warfare agents occurring in Birmingham, Alabama?

2. How prepared is the Birmingham Fire and Rescue Service to manage an incident of this type?
3. Are outside resources available for supporting the department in case of an incident of this type and how well prepared for an incident of this type are these agencies?

BACKGROUND and SIGNIFICANCE

The City of Birmingham is the largest city in the state of Alabama, with a population of approximately 263,000 in 1998 and an area of 163 square miles. Three interstate highway systems and four railroad lines serve it. The largest employer in the city is the University of Alabama at Birmingham.

The Birmingham Fire and Rescue Service

The Birmingham Fire and Rescue Service is a career department providing fire, EMS, and specialty services. Birmingham had 684 personnel operating from 29 fire stations and the department responded to approximately 47,000 incidents in 1998. The department operated 25 engine companies, 2 aerial truck companies, 3 quint companies, 15 ALS transport units, an airport station, a hazardous materials unit and a

decontamination unit. Four battalion chiefs were on duty daily and the daily average manning was 153 personnel.

Sites of a Potential terrorist Attack Using Biological warfare Agents within the City of Birmingham

A terrorist planning an attack using biological warfare agents would find a wide variety of potential targets in the Birmingham area. Since Birmingham is the largest city in the state, it has a large variety of local, state and Federal governmental buildings. Federal buildings such as the Federal Courthouse, an office building containing the local offices of the FBI, ATF and Secret Service, a Federal Reserve Bank and a large district Post Office would provide targets at the Federal level. The Birmingham City Hall and the Jefferson County Court House could prove to be a target for someone with a grudge against government.

Birmingham is the home for the state headquarters of the local power, gas, water and telephone companies. Two large research laboratories (BSL-3s) which do weapons research for the military are located within blocks of each other. An attack on banking or other financial institutions located in Birmingham could cause havoc within the local and regional business communities. Area shopping malls and hotels which have large atrium areas could also prove to be a tempting target for a

terrorist wishing to spread a biological warfare agent within an enclosed area on a target group. The local civic center, coliseum, gymnasiums and stadiums would also bring together a large number of people in a relatively small area.

Yet other possibilities for an attack would be to infect the population as they are walking the streets of downtown at such times as the morning or afternoon commutes or at lunchtime. Any building with a ground level air intake for their HVAC systems could provide a conduit for attack.

Strategic Management of Change Course

This research project was completed in accordance with the applied research requirements of the National Fire Academy's Executive Fire Officer Program. The problem addressed by this research project related directly to Phase I: Analysis of the Change Management Model, as shown in the *Strategic Management of Change* course. This segment of the model was designed to guide fire service managers in the method of analyzing their organizations change requirements. It was anticipated that the analysis of the Birmingham Fire and Rescue Service's abilities to respond to a terrorist attack involving biological warfare agents would be beneficial both to the BFRS and to other fire departments wishing to analyze their abilities to respond to an incident of this type.

LITERATURE REVIEW

The majority of the literature review was drawn from materials accessed from the Internet. Other sources of material included materials obtained from the Learning Resource Center (LRC) and from commercially available reference materials, military sources and materials from seminars, meetings and interviews (both telephone and personal).

Historical Background

The historical background for this applied research project about biological warfare agents and terrorism has its roots back to at least the 6th century BC when the Assyrians poisoned enemy wells with rye ergot. In 1346 during the siege of Kaffa, the Tartar army hurled the bodies of members of their army who had died of the plague over the city walls, spreading the disease to the defenders who were forced to surrender. During the French and Indian War in North America (1754-1767), smallpox contaminated blankets were given to Native Americans loyal to the French by an Englishman. The resulting epidemic caused numerous deaths and degraded the Native American's will to resist. The Biological Weapons Convention that was signed by seventy nations in 1972, bans the development, production and stockpiling of biological weapons. Regardless of this, in late April 1979, an accidental release of anthrax

from a Soviet microbiology facility killed at least sixty-six people in Sverdlovsk. The only confirmed use of a biological warfare agent in the United States was in 1984, when members of the Rajneeshee cult in Wasco County Oregon sprayed salmonella typhimurium bacteria on ten local salad bars in an attempt to influence an election. Seven Hundred and fifty one people became ill; but no one died.

The history of terrorism, while not being able to trace its roots as far back as biological warfare does extend at least back to the first century. During the first century, a Jewish group called the Zealots-Sicarii, resorted to acts of terrorism in order to cause a revolt against the Greeks and Romans. Acts of religious and political terrorism have continued over the centuries and will likely continue into the future.

Eifried (1997) stated that in 1993, Under Secretary of State Bartholomew, while testifying before the Armed Services Committee stated that “ We are especially concerned about the spread of biological and toxic weapons falling into the hands of terrorists...To date (1993), we have had no evidence that any known terrorist organizations have the capability to employ such weapons...however, we can not dismiss the possibilities... it may only be a matter of time before terrorists acquire and use these weapons.”

Lieutenant General Patrick Hughes of the Defense Intelligence Agency testified in 1998 that chemical and biological weapons have a “high probability of being used over the next two decades.”

Richard Davis stated in a report to Congress in 1997 that “While the number of terrorist incidents both worldwide and in the United States has declined in recent years, the level of violence and lethality of attacks has increased.”

According to FBI figures, terrorist activities in the United States in the decade of the 1990's (through 1998) have ranged from a high of twelve in 1993 to a low of zero in 1994 with an average of just over four a year.

Mark E. Gebicke testified before Congress in 1999 that “According to the U.S. intelligence community, conventional explosives and firearms continue to be the weapons of choice for terrorists because chemical and biological agents are more difficult to weaponize and the results are unpredictable.”

Stern (1999) stated that “Between 1970 and 1995, on average, each year brought 206 incidents (of terrorism) and 441 more fatalities.

According to a 1997 U.S. Department of Defense report, “the most lethal biological toxins are hundreds to thousands of times more lethal per unit than the most lethal chemical warfare agents.” This would make biological agents on a per weight basis the most dangerous substances on earth. Mullins (1992) citing Hirsh (1968) stated that just eight ounces of BTX (botulinal toxin) could “kill every living creature on the planet.”

In comparison to chemical weapons, biological agents are much more devastating as evidenced by a statement made by Douglass and Livingstone in 1987 which stated that four tons of the nerve agent VX would be required to cause several hundred thousand deaths if released in an aerosol form in a crowded urban area, compared to only 50 kg (approximately 111 pounds) of anthrax spores.

In 1987, Douglass and Livingstone stated that: “A sophisticated program designed to produce a fissionable device would probably cost hundreds of millions of dollars, whereas type A botulinus toxin, which is more deadly than nerve gas, could be produced for about \$400 per kilogram. A group of C/B experts, appearing before a UN panel in 1969, estimated that for a large scale operation against a civilian population, casualties might cost about \$2,000 per square kilometer with conventional weapons, \$800 with nuclear weapons, \$600 with nerve gas weapons and \$1 with biological weapons.”

Douglass and Livingstone (1987) also stated that “ To a knowledgeable person the procedures required to obtain strains or cultures of very dangerous toxins and diseases – and to produce them in sufficient quantities – are about as complicated as manufacturing beer and less dangerous than refining heroin.”

Colonel David Franz of the United States Army Medical Research Institute of Infectious Diseases (USAMRIID) stated in 1998 that “ We have generally, fewer tools and less information to protect citizens from terrorism than we have to protect a defined military force from the classical biological warfare agents.”

“Everything one needs to know to build a biological weapon can be found in a public library” stated Baum in 1993. Since 1993 was before the days of the Internet, today a person could probably decide this same statement was true concerning the Internet.

Local Influences

Birmingham's Southern Research institute (SRI) and the University of Alabama in Birmingham (UAB) both have at times or are presently doing contractual research work involving biological warfare agents for the United States Government. At this time, research work involving Anthrax

and Venezuelan Equine Encephalitis (VEE) is being conducted within a BSL-3 laboratory at UAB. While amounts of these agents on site are considered small, as Wade stated in 1997 – “One gram (of anthrax)- about 0.04 ounces or the weight of two paper clips- contains enough doses to kill 10 million people.” Accidents at these facilities while not a probability, are a possibility and a release of these materials, regardless of how small, could result in a catastrophic event. The possibility of an employee being able to elude the security that surrounds these facilities and of stealing samples of the materials and providing them to a terrorist group as “seed cultures” is always a possibility, regardless of how remote a possibility it is.

Richard Preston stated in 1998 that “ Development of lethal biological agents or genetically altered agents can be done in a small building by a few Ph.D. researchers, using tabletop machines that are available anywhere in the world at no great cost.”

Typhoid bacteria cultures were developed by two college students, one of whom, a nineteen-year-old “had apparently developed the culture in a school laboratory” according to Kupperman and Kamen in 1989.

Because Birmingham is an area that specializes in research work and with the number of laboratories (both public and private) in the area, the

above two examples seem to indicate at least the possibility that biological agents could be developed in Birmingham.

While the threat of a terrorist attack in Birmingham using biological agents exists, a personal interview with Alan Kneiffer of the Birmingham Jefferson EMA on July 14, 1999, Sergeant Mike Roberson of the Birmingham Police Department's Tactical Unit on May 17, 1999 and Special Agent Tim Kinard of the FBI on May 14, 1999, the threat of an attack on Birmingham using biological agents is rather small; however, it is described as "a low probability, high consequence event."

Unfortunately, Birmingham is no stranger to terrorist acts, from the dynamite explosions that marked the Civil Rights era to the women's clinic blast that claimed the life of a police officer in 1998. Terrorist acts were once acts that only seemed to happen in "big" cities that were far away; but since Oklahoma City, it has become apparent that they can occur anywhere.

Preparedness Issues

On September 23, 1996, Public Law 104-201, The Defense Against Weapons of Mass Destruction Act or the Nunn-Lugar-Domenici legislation was passed and in section 21 it states that: State and local emergency

response personnel are not adequately prepared or trained for incidents involving nuclear, radiological, biological and chemical weapons.

In a March 16, 1999 Washington Post article, Charles Babington quoted President Clinton as stating that: “ his administration will spend millions of dollars to equip and train firefighters to respond to acts of domestic terrorism” which he called a growing threat. “In most acts of domestic terror, the first professionals on the scene will be the firefighters and they are becoming the front-line defenders of our citizens, not just from accidents and arsonists but from those who would seek to sow terror and so undermine our way of life.”

This help is fortunate for in the opinions of Lamont Ewell, Steve Macko and James P. Zeigler, all felt in 1996, that emergency response teams were not prepared for the challenge of dealing with a terrorist or accidental release of nuclear, biological or chemical weapons.

Public Law 104-201 also resulted in the establishment of the Domestic Preparedness Program (DPP). This legislation was designed to enhance the capabilities of federal, state and local response teams to respond to incidents involving Weapons of Mass Destruction (WMD) which include biological warfare agents. It was this legislation which established WMD training in 120 cities (which Birmingham received in May, 1999), a loan of

equipment and training aids for 5 years and established the Chemical/Biological Helpline (1-800-368-6498) for non-emergency requests, a Chemical/Biological Hotline (1-800-424-8802) for emergency reporting and requests and a domestic preparedness website (<http://www.nbc-prepare.org>).

Literature Review Summary and Current Resources

The literature review indicated that while a terrorist attack using biological warfare agents has a very small chance of occurring in Birmingham, that small chance must still be prepared for. Any release of a biological warfare agent (regardless of how small the chance) has the potential for causing large numbers of casualties and chaos within the population of any city, regardless of its size or location. The amount of resources needed to handle even a minute release of a biological warfare agent will tax the resources of even a large, well - prepared city.

Within the literature review, the author found a large body of information pertaining both to terrorism and biological warfare agents. The majority of this information was pertinent, well written and recent. The short coming of much of the literature; however, was that much of the material was in conflict with the rest of the materials. Some authors stated that a terrorist attack using biological warfare agents was inevitable, while

others stated that an attack would never happen. Some sources stated that the agents were simple and cheap to manufacture and distribute, while others stated that they would be impossible to manufacture and distribute the agents without an extensive and expensive support system. The end result was that in the opinion of the author, it would be up to each person to decide for himself or herself whether or not an attack by terrorists using biological warfare agents is a possibility or a probability.

The literature review also provided information pertaining to equipment, medical and decontamination requirements, aids in identifying the agents and pre incident planning and training needs.

The body of knowledge pertaining to both terrorism and biological warfare agents has evidently grown dramatically within the past several years, with the majority of the materials that the author found during the literature review having been written within the past two to three years. With the Federal Government's increased awareness of the possibility/probability of a terrorist attack using NBC agents and with recent national and international events, the number of training courses have increased significantly. An example of this is the fact that within the Domestic Preparedness' *Compendium of Weapons of Mass Destruction Courses*, 110 courses ranging from "Advanced Life Support Response to Hazardous Materials Incidents" to "Use of Auto – Injectors by Civilian

Emergency Medical Personnel to Treat Civilians Exposed to Nerve Agent” are offered. A number of reference books such as *Jane’s Chem-Bio Handbook*, *Chem-Bio: Frequently Asked Questions*, *First Responder Chem-Bio Handbook*, *Medical Management of Biological Casualties and Defense Against Toxin Weapons* are available from civilian or Federal Government sources. Dozens of sites providing reference materials on terrorism and biological weapons are available on the Internet. This increase in materials can only help responders to a terrorist incident involving biological warfare agents and quality information is worth more than its weight in gold, it can be a matter of life or death.

PROCEDURES

The genesis of this paper was in late 1998 when a number of articles appeared in the *Birmingham News* about anthrax scares occurring around the United States and how the Fire Departments responding to them were having difficulties handling them and how financially costly they were proving to be. An Associated Press article written by Amanda Covarrubias appeared in the *Birmingham News* on January 1, 1999 stated that “Anthrax hoaxes are becoming the bomb scares of the ‘90s and they are forcing disaster response experts to re-evaluate how to react to a biological threat.” Burke in the July 1999 issue of *Firehouse Magazine* stated that within the last 10 months, anthrax hoaxes have occurred in at

least 17 states. These articles were dismissed by the Birmingham Fire and Rescue Service as something that happened somewhere else until a anthrax hoax was called into a local women's clinic and the BFRS was not even notified. An article in the January, 1999 issue of the *Reader's Digest* by Rachel Wildavsky entitled "Are We Ready for Bioterror?" also raised questions in the author's mind pertaining to his department's readiness to respond to a terrorist incident involving biological warfare agents.

The research procedure used in preparing this paper began with a literature review at the National Fire Academy's Learning Resource Center during January 1999. Additional information was gathered from an Internet search between February and July 1999. Materials provided with the Domestic Preparedness' training courses, information from co-workers and other individuals, materials from the Birmingham Public Library and the author's own reference material was also used in preparing this paper.

The literature review concentrated on two particular areas: first, was there enough reference materials available on terrorism and biological warfare agents to enable a paper to be done and second, was there enough of a potential of an incident of this type occurring in Birmingham, Alabama to warrant such a research paper?

The literature review provided a positive response to the first question and a number of interviews with local officials familiar with terrorism or biological warfare agents and a local literature review provided a positive answer to the second question also.

Information obtained from members of the Birmingham Fire and Rescue Service's Hazardous Materials Response Unit pertaining to local storage and use of biological warfare agents indicated that there was enough of these agents locally to provide a threat to the citizens of Birmingham. This belief was reenforced by telephone interviews with Alan Kneiffer, Assistant Director of the Birmingham-Jefferson EMA on February 12, 1999; Steve Spencer, Birmingham Branch Director of the Alabama Department of Environmental Management, (ADEM) on February 15, 1999 and Max Richard, Chemical/Biological Safety Officer at UAB on February 21, 1999.

Personal interviews with Captain Mike Daniels, of the Birmingham Fire and Rescue Service's Hazardous Materials Response Unit on March 3, 1999; Captain Tom Binford of the Birmingham Fire and Rescue Service's Decontamination Unit on April 6, 1999 and Captain William Gresham, of the City of Hoover's Hazardous Materials Unit on May 18, 1999 afforded a perspective on available fire department resources and procedures.

A personal interview with FBI Supervisory Special Agent Joseph T. Kinard on May 24, 1999 and a telephone interview with FBI Special Agent Clinton Baker on July 13, 1999 indicated to the author that terrorism of some type was a possibility in Birmingham, Alabama.

The telephone interview with Steve Spencer of ADEM on February 15, 1999 also provided information about the local National Guard and Army Reserve's response capabilities to biological terrorist agents since he is also a Lieutenant Colonel in a Army Reserve Chemical Unit.

A Doctor Fleenor of the Jefferson County (Alabama) Health Department was interviewed on July 7, 1999 pertaining to the medical response capabilities of area hospitals and Lieutenant Colonel Mary E. Sorrell of the 75th Combat Support Hospital was personally interviewed on June 10, 1999 about the Government's program to vaccinate all military personnel (both regular and reserve) against anthrax. Assistant Chief Alan J. Martin and Battalion Chief David E. Nathan of the Birmingham Fire and Rescue's EMS Division were personally interviewed on June 14, 1999 to gain a perspective on the Birmingham Fire and Rescue Service's EMS' ability to respond to, treat and transport victims exposed to biological warfare agents.

A personal interview with Battalion Chief Jerome Roberson, Chief of Training for the Birmingham Fire and Rescue Service on June 15, 1999

was necessary in order to determine the level of the Department's training for terrorist incidents involving biological warfare agents.

Limitations

The two limitations within the paper were to limit the study of the biological warfare agents and their effects to five main agents: anthrax, Venezuelan equine encephalitis, Q-fever, rice blast and ricin. These five were chosen because they represent the five classes of biological warfare agents, which are: bacteria, viruses, rickettsiae, fungi and toxins. The second limitation was to limit the scope of the paper to solely a terrorist attack since even though several of these agents appear naturally in the environment, their appearance as an accident or naturally occurring event would prove rare.

Selected Terms

This list of terms may help readers to better understand terms and expressions used within the body of this applied research project.

Aerosol: A suspension of solid or liquid particles in air.

Ambulatory: Able to move about without assistance.

Bacteria: Single- cell organisms such as anthrax. Bacteria can be grown in artificial media using facilities similar to those found in the brewery business.

Biological Warfare Agents: Living organisms or the materials derived from them that cause disease in or harm humans, animals or plants or cause deterioration of these materials. Biological agents may be used as liquid droplets, aerosols or dry powders.

Consequence Management: Measures to relieve the damage, loss, hardship or suffering caused by emergencies.

Crisis Management: Measures to resolve a hostile situation, investigate and prepare a case for prosecution under Federal law.

Decontamination Unit: In the context of this paper, it is a fire department apparatus which carries equipment which is used to remove hazardous substances from the bodies and equipment of victims exposed to biological warfare agents.

Fungi: Any group of plants mainly characterized by a lack of the green colored compound known as chlorophyll. Potato blight is an example of a fungal pathogen that can do harm to plants and crops.

Hazardous Materials Unit: A fire department apparatus that carries reference materials, detection equipment, tools and protective equipment needed to mitigate an incident involving hazardous materials.

Incident Management System: An organized method for controlling the various tasks that must be performed at an incident. Usually consists of five sections: command, operations, planning, logistics and finance/administration.

Line Source Delivery: A situation where the agent is released in a line such as being released from an aircraft.

Mass Decontamination: The gross cleansing of large numbers of victims of an incident.

Mass Casualty Incident: In Birmingham, an incident having over ten victims.

Micron: One/ one-millionth of a meter. Seven microns = 0.0003 inches.

Non-Ambulatory: Unable to move without assistance.

Pathogen: A disease causing organism.

Point Source Delivery: Where the agent is applied to a single location.

Rickettsiae: Similar to bacteria in structure and form; but they must be grown in living tissue. An example is Q-fever.

Spores: A dormant form of bacteria which can germinate or sprout when conditions are favorable.

Tactical Unit: In Birmingham, it is a specialized police unit, which includes the bomb squad.

Technical Decontamination: A thorough and meticulous cleansing of personnel after exposure to a hazardous material.

Terrorism: As defined by the US Department of Justice it is a violent act or an act dangerous to human life, in violation of the criminal laws of the United States or any segment to intimidate or coerce a government, the civilian population or any segment thereof, in furtherance of political or social objectives.

Toxins: The non-living products of microorganisms of plants or living creatures. An example of a toxin is ricin.

Vaccines: A preparation administered to prevent a specific disease.

Vectors: An animal that carries or transmits a disease producing organism.

Viruses: An infectious microorganism, which is 100 times smaller than bacteria and exists in a particle rather than a complete cell. An example is Venezuelan equine encephalitis.

RESULTS

1. What is the possibility of a terrorist incident involving biological warfare agents occurring in Birmingham, Alabama?

In order to answer this question, the author found it necessary to first determine if there were any of these agents located within the city. Interviews with safety personnel from the two large research labs located in Birmingham which are Southern Research Institute (SRI) and the University of Alabama at Birmingham (UAB),

confirmed that biological warfare agents were indeed located at the facilities.

Interviews with local law enforcement personnel indicated that periodically they are called upon to provide an escort service when these agents are transported outside of the facilities for any reason.

After the literature review indicated that biological warfare agents could be manufactured in a laboratory environment, these also became possibilities for an incident.

Once the author determined that biological warfare agents were located within the city, he then turned his attention to the possibility of a terrorism attack.

Interviews with law enforcement personnel (both local and Federal) and the local EMA, indicated that while the possibility for a terrorist attack in Birmingham was small, it could not be ruled out. And with Birmingham's history of terrorist acts, it became an even greater possibility.

After compiling and analyzing the information from these sources, the answer to Question #1 must be a **YES**. There is a

possibility of a terrorist incident involving biological warfare agents' occurring in Birmingham, Alabama.

2. How prepared is the Birmingham Fire and Rescue Service to manage an incident of this type?

To adequately answer this question, the author had to review the Birmingham Fire and Rescue Service's SOP's (Standard Operating Procedures); to inventory the equipment carried on the department's Hazardous Materials and Decontamination Units; to assess protective equipment issued to the department's fire and EMS personnel and to determine the level of training that department personnel had received.

SOPs:

The Birmingham Fire and Rescue Service did not have a SOP concerning chemical or biological warfare agents until the author developed a policy in March, 1999 (see Appendix A). At this time this policy has not been adopted.

The Department does however have policies covering bomb threats and mass casualty incidents. These policies have been practiced, used and function well.

Hazardous Materials and Decontamination Units:

The Hazardous Materials Unit is based in the central section of the downtown area and the Decontamination Unit is based in another section of the city. Both units operate an engine company as their primary unit and man their specialty units when needed. Both companies are housed with an ALS transport unit that may respond with the specialty unit. Average daily manning on both units is four personnel trained to at least the hazardous materials technician level.

Both the Hazardous Materials Unit and the Decontamination Unit carry level A and B protective suits and 1 hour Self Contained Breathing Apparatus (SCBA). These suits and SCBA would provide adequate protection from biological warfare agents since the primary entry routes for these agents are respiratory, ingestion and dermal. However; the limited number of these suits and SCBA, which are 25 and 10 respectively is limited so that large scale or long term fire department involvement using this equipment would not be possible.

There is no detection equipment on either apparatus that is capable of detecting biological warfare agents.

Limited reference materials concerning biological warfare agents is available on the Hazardous Materials Unit; however, it is equipped with cellular telephones and a fax machine that will enable the downloading of information from resources such as the Chem/Bio Hotline.

The Decontamination Unit is adequately equipped with the materials needed to decontaminate a limited number of victims exposed to a biological warfare agent. Sodium hypochlorite (chlorine bleach), calcium hypochlorite (HTH pool chlorine) and liquid soaps (the decon agent of choice for most biological warfare agents) are carried along with hoses, brushes and towels.

Training for technical decon is adequate; however, this capability is lacking for mass decon (possibly 250-300 victims per hour), which is according to sources such as Moultrie (1999) is what victims of a biological warfare agent need most. Planning is under way to institute mass casualty decontamination training. One common decontamination problem will not have to be addressed, that being water runoff, since Steve Spencer of ADEM has stated that the volume of runoff will quickly disperse any agent washed from the victims. An exception to this may be anthrax. Anthrax develops spores that are very hardy and long lasting. Kupperman

and Trent (1979) stated that “ In spore form it can live for decades, withstanding wide variations in environment.” During World War II, the British conducted tests using *Baccillus anthracis* (anthrax) on the island of Gruinard off of the coast of Scotland. After 20 years, large number of virulent spores remained in the soil. Only after the soil was sterilized with formaldehyde were the anthrax spores finally destroyed.

Protective Equipment:

Department personnel; both fire and EMS, not specifically assigned to the Hazardous Materials or Decontamination Units would respond to an incident involving biological warfare agents wearing the department issued protective clothing. These materials consist of PBI/Nomex protective coats and pants, leather gloves, knee high rubber boots, nomex hoods and polycarbonate helmets. Their respiratory protection would be provided by 30-minute positive pressure SCBA. This equipment if worn properly, will provide adequate skin and respiratory protection from biological warfare agents. However, if these personnel are exposed to an agent, either directly or indirectly, they will have to undergo decontamination. As a matter of policy, these personnel would undergo decon no matter how small the possibility of exposure.

Training:

Limited training has been given to departmental personnel. Approximately 100 members were given some training during the Domestic Preparedness training in May; however all members of the department should receive training in this area because an event such as a terrorist attack using a biological warfare agent will involve large numbers of personnel.

In summary, after reviewing this information, the author has concluded that the Birmingham Fire and Rescue Service **IS** prepared to respond to a terrorist incident involving a biological warfare agent; **HOWEVER**, additional training and equipment is needed in order for the department to fully carry out its mission during an event of this type.

3. Are outside resources available for supporting the department in case of an incident of this type and how well prepared for an incident of this type are these agencies?

If the Birmingham Fire and Rescue Service had an incident involving a terrorist attack using biological warfare agents, the first outside agency that the department would interact with would be

the Birmingham Police Department. The typical Birmingham Police officer has had limited training or exposure to terrorism or biological warfare agents. Even though a number of Birmingham Police officers attended the Domestic Preparedness training, training courses for the remainder of the department have been slow in being implemented. The police department's Tactical Unit; has had hazardous materials, terrorism and WMD in addition to their explosives and other specialized training. The Tactical Unit has participated in WMD training with the fire department and several of their personnel have been trained to the hazardous materials technician level. In an understanding between departments, the fire department will handle the hazardous materials and casualty aspects of a terrorist incident and the police department will handle the explosives and criminal investigation portion.

The first outside agency that the fire department will come into contact with will be the Birmingham-Jefferson Emergency Management Agency (EMA). The EMA can provide limited resources such as level A and B suits, reference materials and to call in outside local resources; but their true value lies in their ability to be a conduit to state and federal resources. If the incident was of such a magnitude as to warrant state resources (i.e. the Alabama National Guard), the EMA would be the agency that would request

the governor to declare a state of emergency in order to activate the appropriate national guard unit(s). While there are approximately 20 national guard units within a 50 mile radius of Birmingham and while all of these units have some CWA assets (such as MOPP suits and M17 or M40 Chemical/Biological Protective Masks) it would take between 4 and 12 hours to get these units activated and on site (personal interview with Captain Wilson Sawyer of the Alabama National Guard, May 18,1999). Captain Sawyer also mentioned a new concept that was being talked about within the Army National Guard was the "RAID" teams that would be activated to respond to incidents involving WMD. In a United State Government Accounting Office (GAO) report issued in May 1999, it states: "Recently the Department of Defense (DOD) approved the creation of 10 National Guard Rapid Assessment and Initial Detection (RAID) teams to assist local and state authorities in assessing the situation surrounding a WMD emergency; to advise these authorities regarding appropriate actions; and to facilitate requests for assistance to expedite the arrival of additional state and federal military assets." The first of these units are to go in service in January 2000 and one of these units is to be located in Georgia. Unfortunately as the report goes on to point out, is that these units will be of limited use since they will still take time to

activate and get onto the scene. Also as stated, they will only duplicate many of the actions of resources already on the scene.

Use of United States Reserve Units such as the Army Reserve's 318th Chemical Unit which is located in Birmingham and whose specialty is CWA decontamination or a "FST" or Forward Surgical Team would require the Governor of Alabama to request a presidential state of emergency. Once this state of emergency was declared, active duty or activated reserve components could be deployed to the scene under the direction of FEMA. Unfortunately, the time frame for this to occur is also from 8 to 24 hours and any response to an incident involving a terrorist attack using biological weapons would be too late. Active duty personnel would be governed under the Stafford Act that limits the actions of regular military personnel within the United States. For example, under the rules of the Posse Comitatus Act, regular military personnel can not enforce civil criminal law within the United States.

The Anniston Army Depot which is located approximately 50 miles from Birmingham, has military CWA specialists and the full range of decontamination and protective equipment; however, gaining permission for these personnel and assets to respond would be complicated and time consuming.

Other military assets such as the Marine Corps' Chemical-Biological Incident Response Force (CBIFR) and the Army's Technical Escort Units (TEU), while extremely qualified and well equipped, are located too far away to be included in any pre-incident planning scenarios.

Under the Presidential Decision Directive 39 (PDD-39) /U.S. Policy on Counterterrorism, dated June 21,1995 the responsibility of response to terrorist attacks within the United States is given to the FBI. When the FBI arrives on the scene, they have the power to bring the full resources of the United States Government to bear. Since the scene of a terrorist attack using biological warfare agents is a Federal crime scene, they become in charge of that scene. They have the power to call in agencies such as the Federal Emergency Management Agency (FEMA), Department of Health and Human Services (DHHS), Environmental Protection Agency (EPA), Department of Energy (DOE), Department of Defense (DOD) and any other Federal agencies as they feel that they need. When the Federal Government takes over, the local agencies' only function becomes to support the Federal agencies' actions.

The medical treatment for victims exposed to a biological warfare agent from a terrorist act, may also experience difficulty in

receiving proper medical attention. This is because unlike a chemical weapons attack, the signs and symptoms of a biological attack may take from hours to days to manifest themselves. Unless the terrorist release of a biological warfare agent was the result of an “advertised” attack such as a bomb release or where notice of the attack was given, the first sign that the fire department may have of an attack may be the sudden reporting of numbers of people having “flu-like” symptoms. For example, as was reported in the May 12, 1999 edition of the *Journal of the American Medical Association*, the first evidence of a clandestine release of anthrax will most likely be patients seeking medical treatment for symptoms of inhalational anthrax. The sudden appearance of a large number of patients in a city or region with acute-onset flu-like illness and case fatalities of 80% or more, with nearly half of all deaths occurring within 24 to 48 hours, is highly likely to be anthrax.” However, confirmation of this may have to wait until samples can be sent to the Center for Disease Control (CDC) in Atlanta or to USAMRIID at Fort Detrick, Maryland for confirmation or identification. Unlike an attack using chemical weapons, the fire department would most likely be providing only a support role such as transporting victims of a biological attack to the hospitals.

Supplies of medications needed to treat the victims of a biological attack may also be overwhelmed due to the large number of possible victims. As Doctor Donald Henderson stated (1998): “The United States is ill-prepared to confront a terrorist attack using biological weapons, and health officials need more money to prepare against such attacks.” This problem may be in the process of being addressed because on April 23, 1998, United States Attorney General Janet Reno testified before a joint hearing of the Senate Intelligence Committee and the Judiciary subcommittee on technology and terrorism that “we need to make sure that we have a significant stockpile...and I don’t think that we do...of vaccines and other medications.” Reno also said that the United States Government was conducting a study of purchasing large stockpiles of vaccines, antidotes and antibodies to deal with the threat to U.S. cities of chemical and biological warfare. Reno stated “ Those medications would be placed strategically throughout the country under a procedure that would maintain the shelf life of stockpiles and would facilitate their prompt availability in the event of a major chemical or biological incident.”

The answer to question #3 is **YES**. Numerous outside agencies are available to assist Birmingham in the event of a terrorist attack using biological warfare agents. They are for the most part well

prepared for an incident of this type and the most difficult part of utilizing them may be to keep them organized and out of each others way. The greatest shortcoming of this outside help is the length of time that it takes to call for, mobilize, transport and get them on scene.

DISCUSSION

Relationships Between the Study Results and the Findings of Others

The literature review supported this study in a number of areas. There is a possibility of a terrorist attack taking place in Birmingham and if one did occur, there is a possibility of a biological warfare agent being a weapon of choice. The literature review showed that knowledgeable people whether local, national or international all saw the possibility of an incident occurring within the foreseeable future. A review of the possible sites of a terrorist or accidental release of a biological warfare agent in Birmingham also added to the possibility of an incident.

In May of 1998, Gary Eifried when discussing the capabilities of emergency responders stated: "Today (1998), most are well-

trained and equipped for “conventional” disaster response. They know their jobs, generally have the equipment that they need, have developed and tested procedures and are dedicated professionals. But they don’t know chemical or biological agent behavior, effects or defense. What they do have, and what they do know, though, gives them 80-90% of what they need...in terms of training, equipment and procedures...to respond to CB terrorism.” This quote quite accurately describes the results of my findings as to whether or not the Birmingham Fire and Rescue Service is prepared to respond to a terrorist incident involving biological warfare agents. While the majority of equipment, knowledge and training is available and in use, additional preparations must be made.

The Author’s Interpretation of the Study’s Results

The author’s interpretation is that as well trained and equipped as he may feel that the Birmingham Fire and Rescue Service is, there is still a great deal of improvement that can be made within the department in order to meet the challenge that would be presented in the event of a terrorist attack using biological warfare agents. There is the possibility for an incident of this type to occur

and as remote as the possibility may appear, the department must be prepared to meet the challenge.

While much of the equipment that responders would need is already available, there is other equipment that be acquired that will assist in the successful mitigation of an incident involving a terrorist attack using biological warfare agents.

Improved capabilities of responders to mass decontaminate large numbers of victims is a necessity. While the use of equipment such as hand lines and aerial equipment is recommended, equipment such as shower enclosures is needed. Also shelters or tents are needed so that victims may remove their contaminated clothing and change into clean clothing (a supply of which will also be needed).

EMS personnel must receive additional training in the signs and symptoms of exposure to a biological agent. Being able to recognize symptoms such as large numbers of people becoming ill with flu-like symptoms during times other than flu season would provide helpful.

The Hazardous Materials Unit's personnel and other personnel must be trained to recognize that a terrorist scene is a crime scene and their carelessness within the scene may destroy the very piece of evidence needed to locate and convict the person or people guilty of the crime.

The results of the study indicate to the author that the Birmingham Fire and Rescue Service while prepared to handle day to day hazardous materials, fire and EMS incidents, must broaden its horizons to include terrorist incidents including those involving biological or chemical weapons.

This study has been beneficial to the author in that while he knew that terrorist events occur (and had even been involved in one), the possible consequences of one involving biological warfare agents had never occurred to him. He now realizes that he and the entire fire department must prepare for the time when one occurs and if the event should never happen, then the knowledge and training would have been still worthwhile. It is better to have the knowledge, training and abilities to handle an incident and not need them than it is to need them and not to have what it takes to protect themselves and the people that we serve.

RECOMMENDATIONS

1. Enact and practice the SOP (Appendix A) that was drafted covering Birmingham Fire and Rescue responses to incidents involving chemical or biological warfare agents.
2. Multi- agency drills and training sessions should be developed and practiced so that each agency is aware of their job during an incident such as a terrorist attack using biological warfare agents. When it is needed is no time to practice a plan.
3. Specialty training concerning terrorist acts and biological warfare agents should be developed and provided to all fire department personnel, regardless of rank or position. This training should include both classroom and field work.
4. EMS and fire personnel should be given additional training pertaining to crime scene and evidence preservation.
5. Attempts should be made to determine and/or improve the abilities and response times of outside agencies such as the Anniston Army Depot's Response Team.

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Appendix A

Draft Copy-BF&RS Policy On Response To Incidents Involving Chemical or Biological Weapons

Purpose:

To establish a standard operating procedure for Birmingham Fire and Rescue Service personnel who are to operate at the scene of an incident involving chemical or biological weapons.

Scope:

This policy will provide basic procedures to be utilized by all Department members in the deployment of equipment and personnel who are to operate at the scene of an incident involving chemical or biological weapons. This policy will also serve as accessible training material for all applicable personnel so that consistent operational procedures will be maintained regarding incidents involving chemical or biological weapons.

Authority:

The authority vested in the Fire Chief by the Code of Alabama, Section 11-43-140, and The Birmingham City Code, Section 9-3-5

Responsibility:

It is the responsibility of the Assistant Chief(s) of Operations to review, update or revise this policy.

Background:

It is no longer a matter of if; but rather when a weapon of mass destruction involving chemical or biological agents will be used against the citizens of the United States. Instances such as the 1995 sarin gas attack in a Tokyo subway or the 1993 bombing of the World Trade Center in New York City in which cyanide was mixed with the explosive prove that the possibility is real for an incident of this type to occur. Because of this, the Birmingham Fire and Rescue Service must be prepared to respond to an incident involving a chemical or biological agent.

Procedures:

Upon notification of a possible incident involving a chemical or biological weapon, Fire Communications should attempt to gather the following information:

- Location
- Number and condition of victims
- What has occurred (fire, explosion, threat etc.)?
- Ongoing conditions (what is happening)

When this information is obtained and a determination that an incident involving a chemical or biological agent has occurred, a dispatch of the following units should occur:

- A full 1st alarm commercial response (3 Engines, 1 Truck, 1 Rescue Unit and 1 Battalion Chief)
- The Hazardous Materials Unit
- The Decontamination Unit with crew
- The Air Unit
- An Additional Battalion Chief

Responding companies should be informed of pertinent information such as scene and weather conditions and told to stage at least 1500' upwind from the incident.

The first arriving unit should establish staging, notify incoming units of its location and institute the Incident Command System.

The Incident Commander and his staff must be concerned with the following:

- Incident "size-up" and assessment
- Contact Chem/Bio Hotline 1-800-424-8802 for assistance
- Notify appropriate support agencies (EMFA, FBI, ADEM, Public Health, etc.)
- Scene control – establishment and control of scene perimeters
- Information gathering/identification of materials(s)
- Establishment of a decontamination area
- Development of an action plan
- Entry planning – personnel
- Triage of injured
- BLS care
- Transportation of victims
- Interaction with other agencies and the media
- Revisions to the action plan as needed
- Monitoring changing conditions
- Evacuation or sheltering in place of victims
- Stabilization of situation
- Record keeping
- Flexibility of actions
- Scene release

NOTE: Many of these actions will be occurring at the same time or in concert with other agencies.

An incident involving a chemical or biological material MUST be addressed as the highest level of a hazardous materials incident with all of the accompanying responsibilities and ramifications.

Responsibilities:

Hazardous Materials Team:

- Personal Protective Equipment selection (Level A recommended)
- Entry
- Possibility/probability of a secondary device
- Reconnaissance and information gathering (what, how, where, how many, etc.)
- Victim recovery
- Possible stabilization of incident scene
- Recognition that the area is a crime scene

Decontamination Team:

- Locate and set up an appropriate decontamination area
- Appropriate level of protection (level B minimum-level A recommended)
- Adequate personnel and equipment
- Appropriate decontamination solutions. Note: Sodium Hypochlorite (common household bleach) is the preferred solution for decontaminating both chemical and biological weapons victims. "Straight" bleach is approximately 5.25% hypochlorite, which is adequate for gross decon. A 0.5% solution (1 gallon of bleach to 9 gallons of water) is preferred for direct skin contact. Gently apply (do not scrub) and rinse with water. Only use water or saline solutions when washing eyes.
- Victims clothing must be removed and handled as contaminated wastes (personal effects should be individually bagged and handled separately).
- The decontamination section must be prepared for numerous victims

Logistics:

- Adequate supplies of needed materials must be on hand or readily available
- Victims must have an area to be confined after decontamination and during triage/processing
- Resources will be needed for a long term operation

Emergency Medical Services:

- EMS must establish and maintain contact with appropriate medical facilities as to treatment, transport, etc. Note: Hospitals may not allow victims directly into their facilities due to possible contamination of their facilities by the victims/EMS personnel
- Isolate and assess victims (level B protection advised)
- Render appropriate medical care
- Prepare units for transport (limit materials exposed to possible contamination evaluations of fire department personnel and victims)
- Be aware that psychosomatic problems may be present
- Be aware of signs and symptoms of chemical and biological agent exposure (See below)

Common signs and symptoms of chemical agent exposures include:

- Runny nose
- Tightness in the chest
- Dimming of vision
- Pinpointing of the pupils
- Drooling Excessive sweating
- Involuntary urination or defecation
- Headache
- Twitching, jerking and staggering
- Convulsions
- Drowsiness
- Coma and convulsions
- Cessation of breathing and death

Staging:

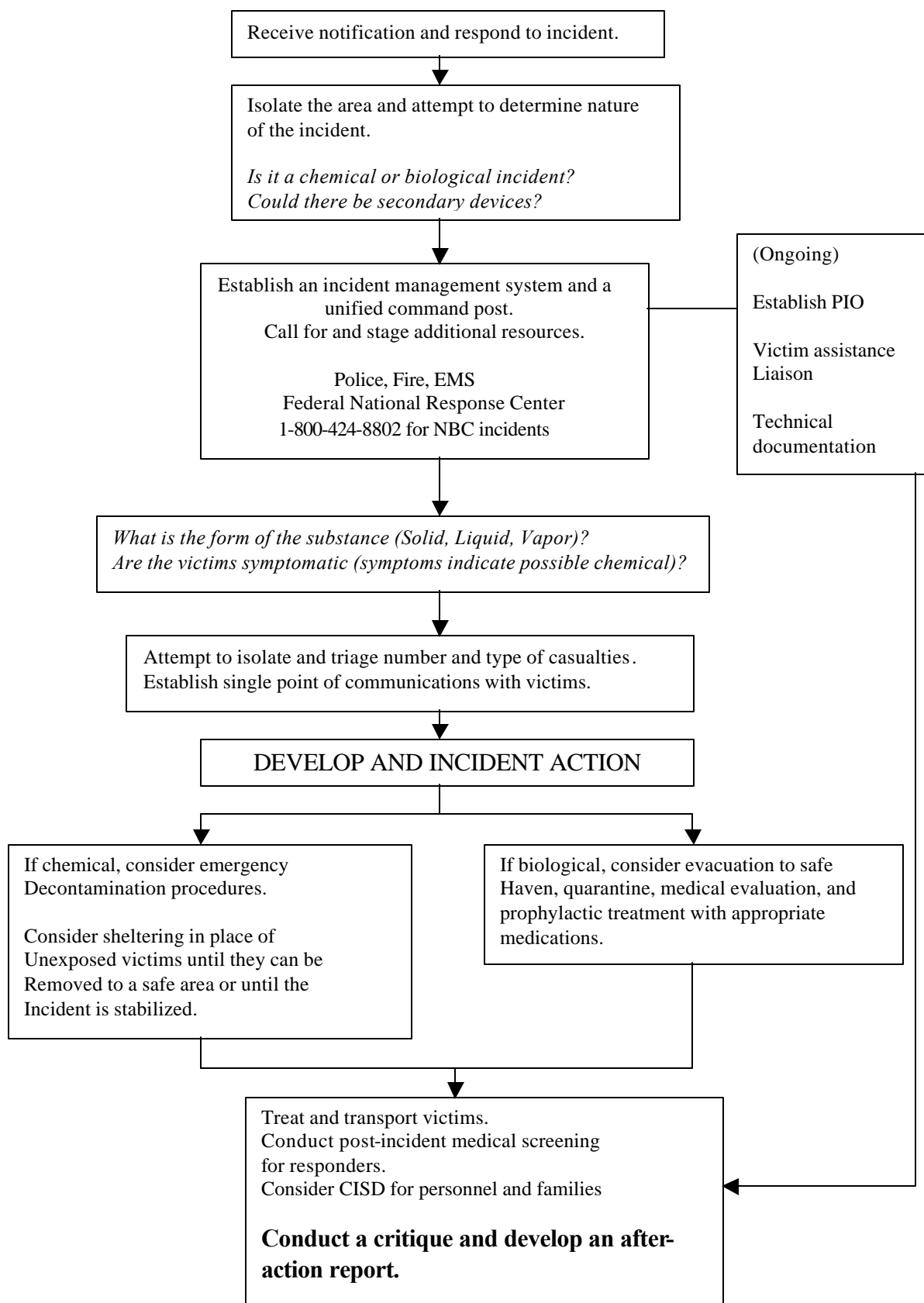
- Provide personnel and equipment as needed

Liaison/PIO:

- Interact with other agencies and media
- Assure continuous flow of pertinent information
- Encourage media to be sensitive to the victims privacy concerns

Action Plan Model:

**A Model Action Plan Chart for
Chemical/Biological Incidents for First Responders**
(This chart provided courtesy of the Washington D.C. Fire Department)



Appendix B

ADEM	Alabama Department of Environmental Management
ALS	Advanced Life Support
ATF	Department of Alcohol, Tobacco and Firearms
BC	Before Christ
BFRS	Birmingham Fire and Rescue Service
BLS	Basic Life Support
BSL	Biological Surety Laboratory
BTX	Botulinal Toxin
C/B	Chemical/Biological
CB	Chemical Biological
CBIFR	Chemical-Biological Incident Response Force
CDC	Center for Disease Control
Chem/Bio	Chemical/Biological
CWA	Chemical Warfare Agent(s)
Decon	Decontamination
DHHS	Department of Health and Human Services
DOD	Department of Defense
DOE	Department of Energy
DPP	Domestic Preparedness Program
EMA	Emergency Management Agency
EMS	Emergency Medical Services

FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FST	Forward Surgical Team
GAO	Government Accounting Office
HVAC	Heating, Ventilation and Air Conditioning
JAMA	Journal of the American Medical Association
kg	Kilogram
LRC	Learning Resource Center
MOPP	Mission Oriented Protective Posture (Military Protective Clothing)
NBC	Nuclear, Biological and Chemical
PDD	Presidential Decision Directive
PIO	Public Information Officer
RAID	Rapid Assessment and Initial Detection
SCBA	Self Contained Breathing Apparatus
SOP	Standard Operating Procedure
SRI	Southern Research Institute
UAB	University of Alabama at Birmingham
USAMRIID	U.S. Army Medical Research Institute of Infectious Diseases
VEE	Venezuelan Equine Encephalitis
VX	Persistent Nerve Agent
WMD	Weapons of Mass Destruction

Appendix C

Examples of Selected Biological Warfare Agents and Their Characteristics

Disease or Agent	Anthrax
Transmit Man to Man	No
Incubation Period	1-6 days
Duration of Illness	3-5 days (usually fatal if untreated)
Lethality	High
Persistence of Organism	Very stable, spores will remain in soil > 40 years

Disease or Agent	Venezuelan Equine Encephalitis
Transmit Man to Man	Low
Incubation Period	2-6 days
Duration of Illness	Days to weeks
Lethality	Low
Persistence of Organism	Relatively unstable

Disease or Agent	Q Fever
Transmit Man to Man	Rare
Incubation Period	10-40 days
Duration of Illness	2-14 days
Lethality	Very low
Persistence of Organism	For months on wood and sand

Disease or Agent	Rice Blast
Transmit man to man	No
Incubation Period	N/A
Duration of Illness	N/A
Lethality	N/A
Persistence of Organism	N/A

Note: Rice Blast is caused by the *Pyricularia grisea* organism. This disease is very effective in destroying rice crops and would therefore be effective in destroying a population's food crops.

Disease or Agent	Ricin
Transmit Man to Man	No
Incubation Period	18-24 hours
Duration of Illness	Days-death within 10-12 days
	If ingested
Lethality	High
Persistence of Organism	Stable

Note: Ricin is a toxin weapon It is made by using the by products of the castor bean.